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The Faroe Cable-Stayed Bridge - Maintenance Experience with Major Components

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Abstract

A cable-stayed bridge such as the Faroe Bridge is a unique and complicated structure, which requires a systematic and technically correct maintenance. The paper presents experience from operation, inspections and maintenance works over the first 14 years of service, with focus on certain major components. Overall costs for operation and maintenance are also presented, as well as costs for some particular operation and maintenance activities.

Based on experience from the first 14 years, the estimated annual total cost of operation and maintenance over the next ten years corresponds to approximately 0.6% of the present value of the cost of construction. This is quite a low level, which indicates the success of maintenance considerations in the design and an effective operation and maintenance program.

Abstract

The Faroe Bridges are two bridges with a total length of approximately 3.3 km, which connect the Danish islands of Zealand and Falster and carry the southern motorway, which connects Copenhagen with Germany and the rest of Europe. The 1,596 m long northern bridge crosses the sea between Zealand and the small Faroe Island. The southern bridge, which is the subject of this paper, is a cable-stayed bridge between Faroe and Falster with a length of 1,726 m. Construction of the bridges commenced in 1980 and they were opened for traffic in 1985.

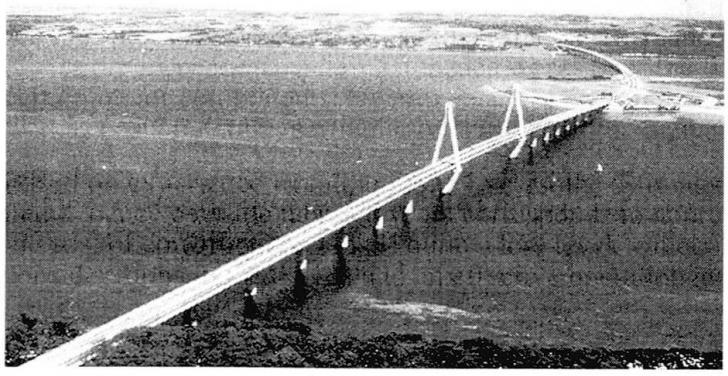


Figure 1 An overview of the Faroe Cable-Stayed Bridge

The superstructure of both bridges is a steel box girder, which is continuous over the entire length with expansion joints located at each end. The cable-stayed section of the southern bridge has a navigation span of 290 m with a vertical clearance of 26 m and two side spans, each with a length of 120 m. The cables are arranged as a fan system of single cables, which are placed in a central plane symmetrically around the pylons. The cables are of the parallel wire type and protection is provided by PE ducts, which are grouted with cement mortar.

The paper presents operation experience, inspection routines and experience, maintenance works and costs from the first 14 years of operation concerning the following topics:

- General routines for inspections.
  Running/continuous Inspections, General Inspections and Special Inspections.
- Corrosion protection of cables.
  A description of the corrosion protection system and inspection experience.
- Wind induced cable oscillations and the system introduced to minimise these.
  The original and the improved interconnection wire system and experience with these.
- Corrosion protection of the steel box girder by means of dehumidification.
  A description of the dehumidification system, operation experience and costs.
- Water intrusion - problems and remedies.
- Expansion joints which each have a total movement capacity in the range of 1 m.
  An unexpectedly early replacement.
- Access equipment.
  Various equipment for inspection and maintenance.

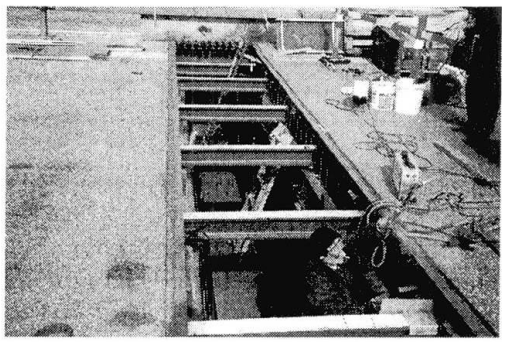
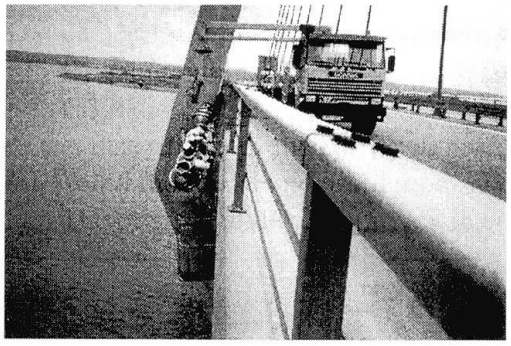


Figure 2 Replacement of expansion joints



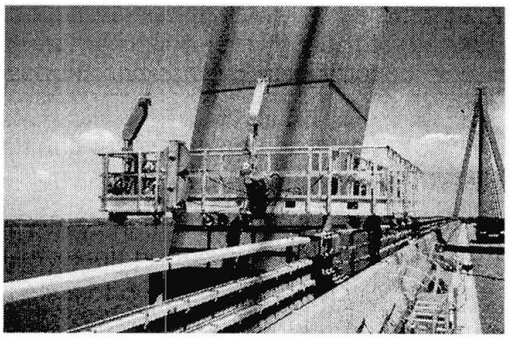


Figure 3 Access equipment, Bucket snooper boom and Skyclimber platform

Furthermore, overall maintenance economy is presented with a breakdown in individual items.

Conclusion

Despite a high level of consideration to maintenance aspects in the design of the Faroe cable-stayed bridge and other cable-stayed bridges, there are still a number of challenging problems to be solved during the service life. There is still room for improvement concerning accessibility and maintainability. The lessons learned from maintenance should be incorporated in future design work in order to obtain even better bridges with lower maintenance costs and a long service lives.